

Short reports

Chronic boric acid poisoning in infants

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SUMMARY We report 7 infants suffering from seizures induced by chronic boric acid ingestion. The boric acid was given by dipping a soother in a proprietary borax and honey mixture. The babies have remained well since the mixture was withheld.

Seven infants presented at this hospital with seizures. All the infants had regularly been given soothers dipped in a proprietary borax and honey compound. When this preparation was withheld the seizures stopped. Serum boron values estimated in 3 of the infants were raised.

Case reports

Four infants presented to this hospital over a period of 6 weeks from December 1980 to January 1981. They were all from Dublin and were aged from 6 to 16 weeks. All presented with a seizure disorder associated with minor symptoms of vomiting, loose stools, and irritability. All had regularly received a borax and honey mixture on their soothers for more than 4 weeks before presentation (Table). A further 3 patients in whom borax

and honey had been implicated in a seizure disorder were reviewed (cases 5, 6, and 7). These infants were again from Dublin, and in the infant in case 7 diarrhoea was so profuse that he was transferred to an infectious disease hospital with a diagnosis of gastroenteritis before the cause of his symptoms was recognised.

The quantity of borax and honey ingested ranged from 1 to 3 28 ml jars per week (Table). Subsequent analysis of the mixture revealed that each 28 ml jar contained approximately 3 g borax.

All the infants had a normal perinatal history. Five of the 7 had a history suggestive of a familial reduced convulsive threshold—4 infants had a family history of febrile convulsions occurring in 1, or in 1 infant, 2 family members, while the sister of 1 infant has possible vaccine associated brain damage. In all cases physical examination showed an irritable but otherwise unremarkable infant. The symptoms and signs are summarised in the Table.

The following investigations were performed: haemoglobin, white cell count, serum sodium, potassium, calcium, magnesium, urea, microbiological examination of cerebrospinal fluid, urine, throat swabs and blood culture. These were normal

Table Details of infants with seizures associated with borax ingestion

Case No	Age (weeks)	Symptoms and signs		Borax ingested		
		Seizures	Others	Duration of ingestion (weeks)	Quantity (ml/week)	Total borax ingested (g)
1	6	Alternating focal seizures recurring over 11 days	Loose green stools, irritable	5	84	15
2	12	Two separate convulsions at age 6 and 12 weeks	Irritable, sleeping poorly, vomiting	9	28	9
3	15	Alternating focal seizures recurring over 3 days	Irritable, vomiting	4	56	8
4	16	Seizure age 9 weeks, alternating focal seizures on admission	Irritable, loose stools	10	84	30
5	8	Alternating focal seizures recurring over 10 days	Irritable	6	56	12
6	10	Two generalised seizures on admission	Diarrhoea and vomiting for 2 weeks, irritable	8	28	8
7	8	Three generalised seizures on admission	Vomiting and severe diarrhoea	4	28	4

1 gram borax equals 4.97 mmol.

in all the children. Skull and chest radiographs were not performed in 1 child but were normal in the others. Electroencephalograms were performed in the patients in cases 2, 4, 5, and 6. These were normal. Blood boron values were measured in 3 children and were abnormal in all 3.

In all 7 infants the seizures stopped when the borax and honey mixture was withheld. At review from 3 months to 5 years after presentation all the children remained off anticonvulsant drugs, had had no further seizures, and all were developing normally.

Results and interpretations

The blood boron values in the patients in cases 1, 3, and 4 were 2.6 µg/ml (0.241 mmol/l), 8.5 µg/ml (0.786 mmol/l), and 8.4 µg/ml (0.777 mmol/l). Blood boron concentrations were measured in 15 children aged 2 to 21 months (mean (SD), 8.4 (6.1) months) who had received no added boron in their diet. In this control group the blood boron value was mean (SD), 0.21 (0.17) µg/ml (0.019 (0.016) mmol/l) with a range of 0.0–0.63 µg/ml (0.0–0.058 mmol/l). These values are similar to those found by Fisher and Freimuth¹ who reported a mean of 0.25 µg/ml (0.023 mmol/l) with a range of 0.0–1.25 µg/ml (0.0–0.116 mmol/l) in a group of 34 children and infants.

In fatal boric acid poisoning boron concentrations have generally been above 50 mg/100 ml (8.1 mmol/l),¹ which is equivalent to 87.5 µg/ml. Although our patients' values were well below this, they were above the range observed in patients exposed only to dietary boron. The total fatal dose by acute boric acid ingestion in infants ranges from 4.5–15.0 g.² The blood boron values of our patients represent a borate ingestion of 15 g over 5 weeks, 8 g over 4 weeks, and 30 g over 10 weeks (Table).

Discussion

In 1907 McWalter³ reported a case of poisoning after the application of borax and honey to an infant's mouth as a remedy for oral thrush. The infant became wasted from vomiting and diarrhoea, developed an ulcerating rash, but had no seizures. In the 1940s topical preparations of boric acid became a popular remedy for nappy rash. By 1953 109 cases of boric acid poisoning had been reported and 55% of these were fatal.⁴ Having been recognised as a potent poison and been superseded by more effective antifungal and antibacterial agents, boric acid fell into disuse. In 1966 the council of the British Paediatric Association stated that in its

opinion there was no therapeutic justification for the continued use of borax and boric acid preparations in infancy.⁵

The association between chronic oral boric acid poisoning and seizures has been reported several times, sometimes as a result of mothers using soothers dipped in a borax and honey compound. Borax and honey is a proprietary product readily purchased across the counter in most Dublin pharmacies. It has been available despite a recommendation from the Pharmaceutical Society of Great Britain that it should not be supplied even with an appropriate warning because of hazards associated with its use in infancy.⁶ It was used in these infants as a pacifier rather than for the manufacturers' recommendation of 'soothing tender gums'. None of the jars of borax and honey carried a warning that borax when ingested or absorbed can be toxic.

Seizures in infants aged 1 to 6 months are uncommon, being outside the period of neonatal convulsions and not yet in the age group for febrile convulsions. They are associated with a poor prognosis and may reflect abnormalities of the developing brain.⁷ In this age group particularly, the possibility of a toxic cause for the seizures should be considered.

Since these reactions were reported to the National Drugs Advisory Board in Dublin, the board has recommended that such preparations should not be used in infants. Boric acid preparations in the Republic of Ireland have been available on prescription only since 1 April, 1983.

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References

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